

REMARKS

Claims 1-20 are currently pending in the application. By this response, claims 7 and 15 are amended for the Examiner's consideration. The above amendments do not add new matter to the application and are fully supported by the original disclosure. For example, support for the amendments is provided, at least, in the claims as originally filed, at FIG. 20, and at pages 34-36 and 39 of the specification. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Allowed Claims

Applicants appreciate the indication that claims 9-19 are allowed. However, Applicants submit that all of the claims are in condition for allowance for the following reasons.

35 U.S.C. §101 Rejection

Claims 1-6 are rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. This rejection is respectfully traversed.

According to MPEP §2106, to properly determine whether a claimed invention complies with the statutory invention requirements of 35 U.S.C. §101, it must first be determined whether the claim falls within at least one of the four enumerated categories of patentable subject matter recited in section 101 (i.e., process, machine, manufacture, or composition of matter). Applicants respectfully submit that the invention recited in claim 1 is directed to a process, and, therefore, falls within one of the four enumerated categories.

Merely determining whether a claim falls within one of the four enumerated categories of patentable subject matter recited in 35 U.S.C. §101 (i.e., process, machine, manufacture, or composition of matter) does not end the analysis because claims directed to nothing more than

abstract ideas, natural phenomena, and laws of nature are not eligible for patent protection. A claim that falls within an enumerated statutory category and does not cover a 35 USC §101 judicial exception (*i.e.*, an abstract idea, natural phenomenon, or law of nature) is clearly directed to statutory subject matter. However, a claim that does include a judicial exception may still be eligible for patent protection if it either: (A) transforms an article or physical object, or (B) produces a useful, concrete, and tangible result. For example, the “application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.” *Diamond v. Diehr*, 450 U.S. 175, 187, 209 USPQ 1, 8 (1981). Applicants respectfully submit that the claimed invention comprises a process that produces a useful, concrete, and tangible result, and, therefore, is directed to statutory subject matter.

In the Final Office Action, the Examiner asserts that the invention recited in claim 1 does not transform an article or a physical object. The Examiner acknowledges that the claimed invention produces a useful and concrete result, but asserts that the claimed invention fails to produce a tangible result. More specifically, the Examiner is of the opinion that

Merely measuring a gel state or change in sol-gel state as in claim 1 is not sufficient to constitute a tangible result, since the outcome of the measuring step is an abstract value that is not being claimed as being used in a disclosed practical application nor as claimed is it made available in such a manner that its usefulness in a disclosed practical application can be realized.

Applicants respectfully disagree, and submit that the claimed invention does produce a useful, concrete, and tangible result for the reasons described herein. As the Examiner acknowledges that the claimed invention produces a useful and concrete result, the rebuttal herein is limited to the “tangible result” prong of the §101 analysis. MPEP §2106 provides the following guidance for the “tangible result” prong of the §101 analysis:

The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception, in that the process claim must set forth a practical application of that judicial exception to produce a real-world result. *Benson*, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had “no substantial practical application.”). “[A]n application of a law of nature or mathematical formula to a ... process may well be deserving of patent protection.” *Diehr*, 450 U.S. at 187, 209 USPQ at 8 (emphasis added); see also *Corning*, 56 U.S. (15 How.) at 268, 14 L.Ed. 683 (“It is for the discovery or invention of some practical method or means of producing a beneficial result or effect, that a patent is granted . . .”). In other words, the opposite meaning of “tangible” is “abstract.”

Claim 1 recites a method for evaluating a material body by a scattered light observation system which observes a gel state or a gel-formable sol state material body illuminated with a coherent light through a two dimensional image recognizing means, comprising measuring a gel state or a change in sol-gel state of said material body using a light section formed on an image forming surface or conditions of a speckle pattern. In non-limiting exemplary embodiments of the invention, a coherent light source is applied to a material body such that scattering of the light occurs on the incident side surface of the material body and/or on an opaque member on the opposite side of the material body depending upon the transmissivity (e.g., opacity) of the material body. Specifically, spots having a strong brightness (i.e., speckles) are generated by the interference of light and an irregular pattern of light and darkness (i.e., speckle pattern) appears. These image formation conditions of light and conditions of the speckle pattern are captured as a two-dimensional image by an image recording means (e.g., CCD camera, etc.). Information regarding the gel state and sol-gel state change of the material body can be obtained from the

speckle values (or the irradiating light section) using a pre-determined relational expression. For example, pages 18-19 of the specification disclose

Regarding the aforementioned relational expression of speckle values and quality evaluation values, a regression expression prepared in advance based on model data ..., a learning structure of a neuro-computer prepared using teacher data, a theoretical expression by fuzzy logic, a theoretical expression by genetic algorithm and the like are used. By using the relational expression, properties and quality values of a material body can be obtained from the evaluation values of the image formation of irradiation light and speckle pattern.

Hence, measuring a gel state or a change in sol-gel state of said material body, as recited in claim 1, is more than a mere abstract idea. The measuring includes utilizing a relational expression to determine the gel state or a change in sol-gel state from conditions of a measured light section or speckle pattern. In other words, the claimed invention recites more than mere measuring, because the determination of the gel state or a change in sol-gel state of said material body includes the application of a predetermined relation expression to a measured value. Moreover, the measured gel state or change in sol-gel state of the material body may be used as an inspection criteria, for example, in food production lines. Thus, the claimed invention is not abstract, and does produce a tangible result. As such, the claims are directed to statutory subject matter, and the instant rejection under 35 U.S.C. §101 is improper.

Accordingly, Applicants respectfully request that the rejection over claims 1-6 be withdrawn.

35 U.S.C. §112 Rejection

Claim 7 is rejected under 35 U.S.C. §112, 2nd paragraph. The Examiner asserts that claim 7 is indefinite because the recitation “at least one of two-dimensional image recognizing means” is unclear. This rejection is respectfully traversed.

Applicants submit that the above-noted recitation of claim 7 is clear and definite when read in light of the specification and the teaching of the prior art. Nevertheless, in order to advance prosecution, claim 7 is amended to recite “at least one two-dimensional image recognizing means”. Thus, the rejection is moot.

Accordingly, Applicants respectfully request that the §112, second paragraph, rejection of claim 7 be withdrawn.

35 U.S.C. §102 Rejection

Claims 7 and 8 are rejected under 35 U.S.C. §102(b) for being anticipated by U. S. Patent No. 4,641,527 issued to Hiroi *et al.* (“Hiroi”). This rejection is respectfully traversed.

The present invention relates to a method and a device for the non-destructive, non-contact and quick evaluation of changes in the gel state and sol-gel state of a material body capable of causing changes in the gel state and sol-gel state of a gel material body, using a two dimensional image-analyzing technique and making use of an image formation or speckle pattern of a coherent irradiation light section as the index. Independent claim 7 recites, *inter alia*,

a light irradiation device which irradiates a light having at least one spot shape or line shape section in a first direction onto a material body;

a light irradiation photographing device comprising at least one two-dimensional image recognizing means;

a moving device for moving at least one of (i) the light irradiating device and the two dimensional image recognizing means and (ii) the material body in a direction transverse to the first direction, for carrying out scanning measurement of almost full face or full face of the material body which can be observed in a photographing direction of the two-dimensional image recognizing means.

The Examiner asserts that Hiroi's laser 12 constitutes a light irradiation device, lead 8 constitutes a material body, speckle image detection optical system 18 constitutes a photographing device, storage type two dimensional sensor 35 constitutes a two-dimensional image recognizing means, and table controller 22 constitutes a moving device. Specifically, the Examiner asserts that the laser 12 is irradiated in a vertical direction and the table controller 22 moves at least one of the light irradiating means and the material body horizontally. Applicants disagree and submit that Hiroi does not disclose these features.

Hiroi discloses an method and apparatus for inspecting soldered joints on circuit boards. In Hiroi, a soldered lead 8 connecting an object 7 to a circuit board 6 is moved by a table 19 to an inspection position. At the inspection position, a laser beam is irradiated on the top surface of the lead 8, and simultaneously an air jet 10 is impinged onto the lead 8. Under application of the air jet, the lead 8 will not vibrate if the soldered joint is acceptable, but will vibrate if the joint is defective. Vibration of the lead 8 is detected by a sensor 17 that detects movement of a speckle pattern of the laser. Since the laser speckle pattern will move as the lead 8 moves, a movement of the lead 8 can be detected by observing a movement of the laser speckle pattern by sensor 17.

However, Hiroi does not disclose a light irradiation device which irradiates a light having at least one spot shape or line shape section in *a first direction* and a moving device for moving at least one of the light irradiating device and the two dimensional image recognizing means and the material body *in a direction transverse to the first direction*, as recited in claim 7. Contrary

to the Examiner's assertions, Hiroi does not disclose that the laser 12 is emitted in a vertical direction and that the table controller 22 moves the lead 8 in the horizontal direction. There is no portion of Hiroi's written specification that describes the direction of the laser as vertical and the direction of movement of the table controller 22 as horizontal. Moreover, the drawings are all shown in isometric view and do not define the direction of the laser as vertical and the direction of movement of the table controller 22 as horizontal. As such, it is improper for the Examiner to associate a vertical direction with laser 12 and a horizontal direction with table controller 22 when Hiroi does not expressly or impliedly do so. Therefore, Hiroi does not disclose a light irradiation device which irradiates a light in *a first direction* and a moving device for moving at least one of the light irradiating device and the two dimensional image recognizing means and the material body *in a direction transverse to the first direction*.

Moreover, Hiroi does not disclose that the moving device is for moving at least one of the light irradiating device and the two dimensional image recognizing means and the material body for carrying out scanning measurement of almost full face or full face of the material body, as further recited in claim 7. Hiroi discloses that the table controller 22 moves the lead 8 to an inspection position. At the inspection position, laser 12 is impinged upon a single point of the lead 8, such that movement of the speckle pattern of the laser may be detected to determine vibration of the lead 8. By using a single inspection position, Hiroi does not disclose carrying out scanning measurement of almost full face or full face of the material body, as required by claim 7.

Applicants submit that claim 8 depends from allowable independent claim 7, and is allowable at least for the reasons described above with respect to claim 7.

Accordingly, Applicants respectfully request that the rejection over claims 7 and 8 be withdrawn.

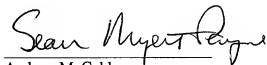
Other Matters

Applicants note that the Examiner has failed to indicate claim 20 as pending on the Office Action summary, and has failed to treat claim 20 on the merits in the Detailed Action. Since claim 20 depends from allowed claim 9, it is presumed that claim 20 is allowed as well. However, clarification of the status of claim 20 is respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicants hereby make a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 19-0089.

Respectfully submitted,
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